

# Inflatable Aerocapture Decelerators with Shape Morphing Trajectory Control, Phase II

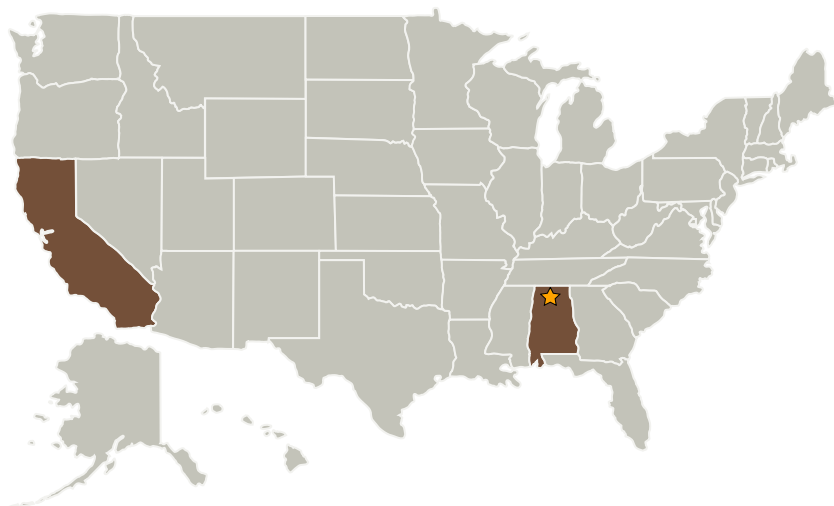
Completed Technology Project (2004 - 2006)



## Project Introduction

The proposed research is focused on developing an aerocapture decelerator that is substantially lighter than other approaches by using lightweight, fiber-reinforced films in its construction and by being a smaller size (higher ballistic coefficient) than previously studied ballutes that operate without thermal protection. A second objective is to develop an innovative method of control for deployable aerocapture decelerators employing shape-morphing lift modulation. Aerocapture is strongly enhancing for planetary exploration because the decelerator mass is less than the fuel mass needed for the same delta-V, and therefore results in a higher payload fraction in orbit. Inflatable drag devices are a promising type of aerocapture decelerator because (1) they are lighter than conventional fixed-geometry aeroshells, and (2) they can be much larger than the interior of a launch fairing and thus enable heavier spacecraft. This aerocapture technology also applies to supersonic decelerators for Entry, Descent and Landing Systems (EDLS) and to other systems requiring supersonic deceleration and stabilization. Trajectory control by shape-morphing lift modulation also enhances EDLS as part of precision guided landing capability. The anticipated Phase II results include the design, manufacture and testing of a full-scale, flight-weight inflatable torus, advancing the key inflatable technology for aerocapture decelerators to TRL 4.

## Primary U.S. Work Locations and Key Partners



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## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Center / Facility:

Marshall Space Flight Center (MSFC)

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Marshall Space Flight Center(MSFC)	Lead Organization	NASA Center	Huntsville, Alabama
Vertigo Inc	Supporting Organization	Industry	Lake Elsinore, California

Primary U.S. Work Locations	
Alabama	California

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

## Technology Areas

**Primary:**

- TX09 Entry, Descent, and Landing
  - └ TX09.2 Descent
    - └ TX09.2.1 Aerodynamic Decelerators